

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

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 in its capacity as elected Office

Date of mailing (day/month/year) 07 March 2001 (07.03.01)	
International application No. PCT/GB00/02505	Applicant's or agent's file reference GML2032
International filing date (day/month/year) 29 June 2000 (29.06.00)	Priority date (day/month/year) 30 June 1999 (30.06.99)
Applicant HUDD, Adrian, Gerald	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 29 January 2001 (29.01.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
11 January 2001 (11.01.2001)

PCT

(10) International Publication Number
WO 01/02243 A1

(51) International Patent Classification⁷: **B63B 59/08**

(21) International Application Number: PCT/GB00/02505

(22) International Filing Date: 29 June 2000 (29.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9915148.2 30 June 1999 (30.06.1999) GB

(71) Applicant and

(72) Inventor: **HUDD, Adrian, Gerald** [GB/GB]; 5 Waters
Edge, Port la Salle, Yarmouth, Isle of Wight PO41 0XD
(GB).

(74) Agent: **BARKER BRETTELL**; Medina Chambers, Town
Quay, Southampton, Hampshire SO14 2AQ (GB).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

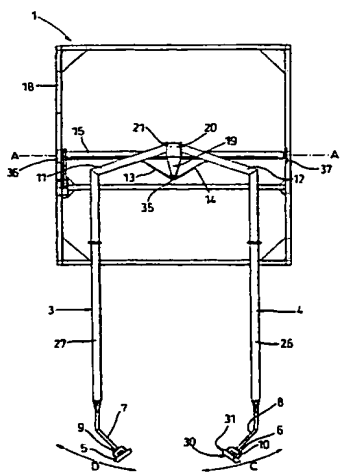
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

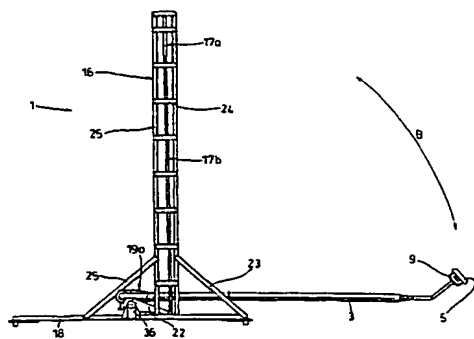
- With international search report.
- Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

[Continued on next page]

(54) Title: **BOAT CLEANING ASSEMBLY**



(57) **Abstract:** A marine vessel cleaning assembly (1) comprising cleaning means (5, 6) and displacement means (17a, 17b) supported on a framework (18) for location under the water, the cleaning means comprising a pair of brushes (5, 6) rotatably mounted on a pair of arms (3, 4) which are pivotable about a submerged axis (A-A). In use the brushes are caused to rotate and contact fouling on the hull of the vessel and are pivoted generally upwardly and downwardly of the hull, the vessel being conveyed with respect to the pivotal axis of the arms (3, 4) so that the entire hull of the floating vessel may be cleaned. The inventive cleaning assembly advantageously eliminates the significant financial costs associated with arranging for a marine vessel to remain on hard-standing and also reduces the time required to clean the hull of a marine vessel.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

BOAT CLEANING ASSEMBLY

The present invention relates to cleaning assemblies and in particular to marine vessel cleaning assemblies.

5 It is common practice for both power and sailing craft to be cleaned at least twice a year, and where performance and fuel economy are required, these can be increased significantly. However, anti-fouling paints are becoming increasingly expensive and because of world-wide anti-pollution laws the paints available to both the commercial and leisure industries are becoming less effective.

10 According to a first aspect of the invention there is provided a marine vessel cleaning assembly comprising cleaning means and displacement means supported on a framework adapted for location under the water, the arrangement being such that, in use, the displacement means is operative to urge the cleaning means generally upwardly and downwardly
15 of a hull of a floating marine vessel, and the cleaning means is arranged to contact fouling on the hull.

Preferably the displacement means comprises pivot means which is operative to pivot the cleaning means, about a substantially horizontal axis, generally upwardly and downwardly of the hull.

20 Preferably the cleaning means comprises rotatably mounted brush means which, in use, is caused to rotate.

The assembly desirably comprises sensing means which is operative to monitor a measure of the resistance to the rotation of the brush means.

Preferably the assembly comprises control means which is operative to control the degree of generally upwardly and downwardly directed displacement of the brush means.

5 The assembly preferably comprises lateral displacement means which is operative to allow generally lateral displacement of the cleaning means with respect to the hull.

Preferably the pivot means is operative to pivot the cleaning means about an axis which is submerged.

10 The assembly preferably comprises a pair of arms, the cleaning means being mounted on the arms. The cleaning means is preferably located towards one end of each arm. Preferably each arm is pivotable generally upwardly and downwardly of the hull. Preferably each arm is pivotable generally laterally of the hull.

15 According to a second aspect of the invention there is provided a method of cleaning the hull of a floating marine vessel comprising displacing cleaning means generally upwardly and downwardly of a hull, and arranging that the cleaning means contacts with fouling on the hull.

Preferably the method comprises pivoting the cleaning means generally upwardly and downwardly of the hull.

20 The method preferably comprises causing relative translational movement of the hull with respect to the pivotal axis of the cleaning means.

The method desirably comprises causing the cleaning means to rotate.

Preferably the method comprises controlling the degree of generally upwardly and downwardly directed movement of the cleaning means in response to a measure of the resistance to rotation of the cleaning means.

The invention will now be further described by way of example only with
5 reference to the accompanying drawings in which:

Figure 1 is a plan view of an assembly in accordance with the invention;

Figure 2 is a side elevation of the assembly shown in Figure 1;

Figure 3 is a front elevation of the assembly shown in Figures 1
10 and 2, and

Figure 4 is a block diagram of the control arrangement of the assembly shown in Figures 1, 2 and 3.

With reference to the figures, a marine vessel cleaning assembly 1 comprises a pair of pivotable arms 3 and 4 which are each provided at
15 their free ends with a rotatably mounted brush 5 and 6 respectively. The arms are pivotable about an axis A-A on an axle 15 which is mounted on a base framework 18, the arms being pivotable about axis A-A by means of an upright hydraulic ram 17a and a tie rod 17b which is connected to the ram 17a.

20 With reference in particular to Figure 1, the arms 3 and 4 each comprise a central portion 27, 26 and two inwardly directed portions, 7 and 11, and 8 and 12 respectively. The adjacent inwardly directed arm portions 11 and 12 are connected to the distal end of the respective central portions 27 and 26 which are located towards the axle 15. The arm

portions 7 and 8 are located at the opposite distal ends of the central portions 27 and 26 respectively.

On each of the arm portions 7 and 8 there is mounted on gimbals 9 and 10 a brush 5 and 6, respectively. The gimbals provide free suspension in all planes for the respective brush. (It should be noted that for reasons of clarity the brushes are shown in a different orientation in the different Figures.) Each brush 5 and 6 comprises bristles provided on a front flat circular surface 30 and on a tapered outer surface 31. The brushes are provided with hydraulic drive means (not illustrated) which is operative to rotate the brushes. Flexible conduits (not shown) which carry the actuating hydraulic fluid are provided internally of the arms 3 and 4. Each arm 3 and 4 is pivotally mounted for generally lateral movement about pivots 21 and 20 in arcs C and D respectively.

The assembly 1 further comprises arm mounting means which comprises an upper limb 19a and a lower limb 19b. The limbs 19a and 19b extend generally longitudinally of the assembly 1. Hydraulic cylinder assemblies 13 and 14 are provided which are pivotally attached at one end to the arm portions 11 and 12 and at the opposite end to a bracket 35, the bracket 35 being secured between the free ends of the limbs 19a and 19b. The limbs 19a and 19b are fixedly secured to the axle 15, the pivots for said axle being provided on two upstanding brackets 36 and 37 which are attached to the base framework 18.

An operating arm 22 is attached at one end to the axle 15 and at its other end to the lower end of the tie rod 17b. The ram 17a and the tie rod 17b are enclosed by an upright framework 16 which comprises two opposing upright members 25 and a plurality horizontal bridges 24, each of which is attached to both upright members and ensures the rigidity of the

upright framework 16. Inclined struts 23 and 25 are attached to a respective upright 25 and to the base framework 18.

The operation the assembly 1 will now be described with reference to Figure 4.

5 The assembly is submerged in a suitable region of water. The assembly 1 is attached to a mooring (not shown) and the base framework 18 rests on the seabed or, if the region of water is of substantial depth, the assembly 1 may be secured to the mooring so that the base framework 11 is above the seabed. A marine vessel, for example a yacht (not shown),
10 is then manoeuvred towards the assembly so that the vessel is positioned above the arms 3 and 4. A winch configuration (not shown) is then attached to a stern line and a bow line of the vessel so that the vessel may be conveyed across the axis A-A. The winch configuration is operative to convey the vessel in either a forwards or a backwards
15 direction.

The tie rod 17a is then actuated by associated hydraulic drive means so that the arms 3 and 4 are pivoted upwardly about horizontal axis A-A towards the surface of the water. On reaching the surface of the water a signal is sent to memory means of the assembly control means by the
20 user so that the vertical position of the tie rod 17b which corresponds to the arms being at the waterline is stored. Position sensing means is then operative to monitor the vertical position of the tie rod 17b. Using the control means, which comprises a console, a user then activates the hydraulic brush drive means so as to rotate the brushes 5 and 6.
25 Hydraulic drive means associated with the hydraulic cylinder devices 13 and 14 is then activated so as to urge the arms 3 and 4 towards the hull of the vessel. Sensing means is provided which is operative to monitor the back pressure of the hydraulic fluid used to actuate the brushes.

Thus when the brushes come into contact with fouling on the hull, resistance to the rotation of the brushes will increase and the sensed back pressure of the hydraulic fluid of the brushes will increase accordingly as a result. The control means adjusts the hydraulic cylinder assemblies 13 and 14 so as to move the brushes towards or away from the hull so that a stored, predetermined value of the back pressure of the hydraulic driving fluid of the brushes is achieved. This predetermined back pressure value is such that an appropriate pressure is applied to the fouling and the hull by the brushes so that fouling is removed with the minimum of any hull paint.

Once the predetermined pressure value has been reached the cleaning operation is commenced and in so doing the hydraulic ram 17a causes the arms 3 and 4 to pivot downwardly about axis A-A. The correct pressure applied to the fouling on the hull is so maintained as the arms pivot about pivots 21 and 20 to follow the curved profile of the hull. The pivots 21 and 20 allow for displacement of the arms 3 and 4 which is generally lateral of the longitudinal axis the hull of the vessel. This is particularly advantageous since there is no requirement to initially align a vessel to the arms 3 and 4 but rather the arms will align to the position of the vessel. Moreover, the length of the arms 3 and 4 is such that only a relatively small force is required to pivot the arms about pivots 20 and 21, and given that the brushes are mounted on the gimbals 9 and 10, the assembly can allow for any side-to-side movement of the vessel caused by wave motion thus reducing the risk of damage being caused to the vessel as a result of such movement during the cleaning process.

As the arms sweep downwards through arc B, the rotating brushes eventually meet underneath the hull. When the brushes come into rotational contact with each other, the senses of rotation of the brushes

are such that the sensed back pressure of the hydraulic brush drive means decreases. In response to this drop in back pressure the control means controls the hydraulic cylinder assemblies 13 and 14 to urge the arms 3 and 4 apart and generally outwardly of the hull. The control means then
5 causes the winch means to be activated to convey the vessel a predetermined distance, typically equal to half the width of the brushes, perpendicular to the axis A-A. Whilst the brushes are still apart the arms are then pivoted generally upwardly of the hull through a predetermined angle by axle 15 and then towards the hull to contact with any fouling
10 thereon. This step of pivoting the brushes outwardly, upwardly and then inwardly ensures that if the vessel has moved laterally during the time that the brushes are in rotating contact under the hull, the brushes can 'locate' the displaced vessel. Once the predetermined value of back pressure of the hydraulic brush drive means is attained, the brushes are
15 pivoted generally upwardly of the hull.

Once the tie rod 17b reaches the predetermined position corresponding to that angular position of the arms 3 and 4 at which the brushes are at water level, the arms 3 and 4 are urged laterally outwardly of the hull so that the brushes are no longer in contact therewith. The vessel is then
20 moved forward the predetermined distance by the winch means. The arms are then urged laterally inwardly of the hull so that the brushes come into contact with the fouling with the required pressure. The brushes are then caused to sweep generally downwardly of the hull. The cleaning process continues in the same fashion until the whole length of
25 the hull has been subjected to the brushes, at which point the winch means will have conveyed the vessel clear of the arcuate paths of the brushes.

It is important to note that the cleaning action of the rotating brushes is more suitably described as a wiping action rather than a scrubbing action. This is because the bristles of each brush are rolled against the fouling on the hull as opposed to using the tips of the bristles.

- 5 It will be appreciated that the assembly 1 may be adapted so that it is the assembly 1 which is conveyed with respect to a substantially stationary marine vessel.

The present invention offers many important advantages. Since a marine vessel may be cleaned whilst afloat, the significant financial costs
10 associated with arranging for the vessel to remain on hard-standing are eliminated. Moreover, the time taken to clean a marine vessel using the inventive assembly is greatly reduced compared to that required when the vessel is taken out of the water to be cleaned by conventional methods. Since use of the inventive assembly can avoid the use of anti-fouling
15 paints, the pollution introduced into the marine environment by such substances can be substantially reduced.

It will also be appreciated that whereas the cleaning means of the assembly comprises brushes, the cleaning means may comprise forced water or compressed air. Furthermore the brushes could be driven
20 pneumatically or by a rotating motor.

During operation of the assembly the control means is operative to deactivate the hydraulic cylinder assemblies 13 and 14 and/or the hydraulic ram 17a if a predetermined pressure is exceeded in the assemblies 13 or 14 or the ram 17a respectively.

CLAIMS

1. A marine vessel cleaning assembly (1) comprising cleaning means (5, 6) and displacement means (17a, 17b) supported on a framework (18) adapted for location under the water, the arrangement being such that, in use, the displacement means is operative to urge the cleaning means (5, 6) generally upwardly and downwardly of a hull of a floating marine vessel, and the cleaning means is arranged to contact fouling on the hull.
2. A marine vessel cleaning assembly (1) as claimed in claim 1 in which the assembly comprises pivot means (17a, 17b, 15, 22) which is operative to pivot the cleaning means (5, 6), about a substantially horizontal axis (A-A), generally upwardly and downwardly of the hull.
3. A marine vessel cleaning assembly (1) as claimed in claim 2 in which the pivot means (17a, 17b, 15, 22) is operative to pivot the cleaning means (5, 6) about an axis (A-A) which is submerged.
4. A marine vessel cleaning assembly (1) as claimed in claim 1, claim 2 or claim 3 in which the cleaning means (5, 6) comprises rotatably mounted brush means (5, 6) which, in use, is caused to rotate.
5. A marine vessel cleaning assembly (1) as claimed in claim 4 in which the assembly comprises sensing means which is operative to monitor a measure of the resistance to the rotation of the brush means (5, 6).
6. A marine vessel cleaning assembly (1) as claimed in claim 4 or claim 5 in which the assembly comprises control means which is operative to control the degree of generally upwardly and downwardly directed displacement of the brush means (5, 6).

7. A marine vessel cleaning assembly (1) as claimed in any preceding claim in which the assembly comprises lateral displacement means (13, 14, 20, 21) which is operative to allow generally lateral displacement of the cleaning means (5, 6) with respect to the hull.

5 8. A marine vessel cleaning assembly (1) as claimed in any preceding claim in which the assembly comprises a pair of arms (3, 4), the cleaning means (5, 6) being mounted on the arms (3, 4).

9. A marine vessel cleaning assembly (1) as claimed in claim 8 in which the cleaning means (5, 6) is located towards one end of each arm
10 (3, 4).

10. A marine vessel cleaning assembly (1) as claimed in claim 8 or claim 9 in which each arm (3, 4) is pivotable generally upwardly and downwardly of the hull.

11. A marine vessel cleaning assembly (1) as claimed in claim 8, claim
15 9 or claim 10 in which each arm (3, 4) is pivotable generally laterally of the hull.

12. A method of cleaning the hull of a floating marine vessel comprising displacing cleaning means (5, 6) generally upwardly and downwardly of the hull, and arranging that the cleaning means contacts
20 with fouling on the hull.

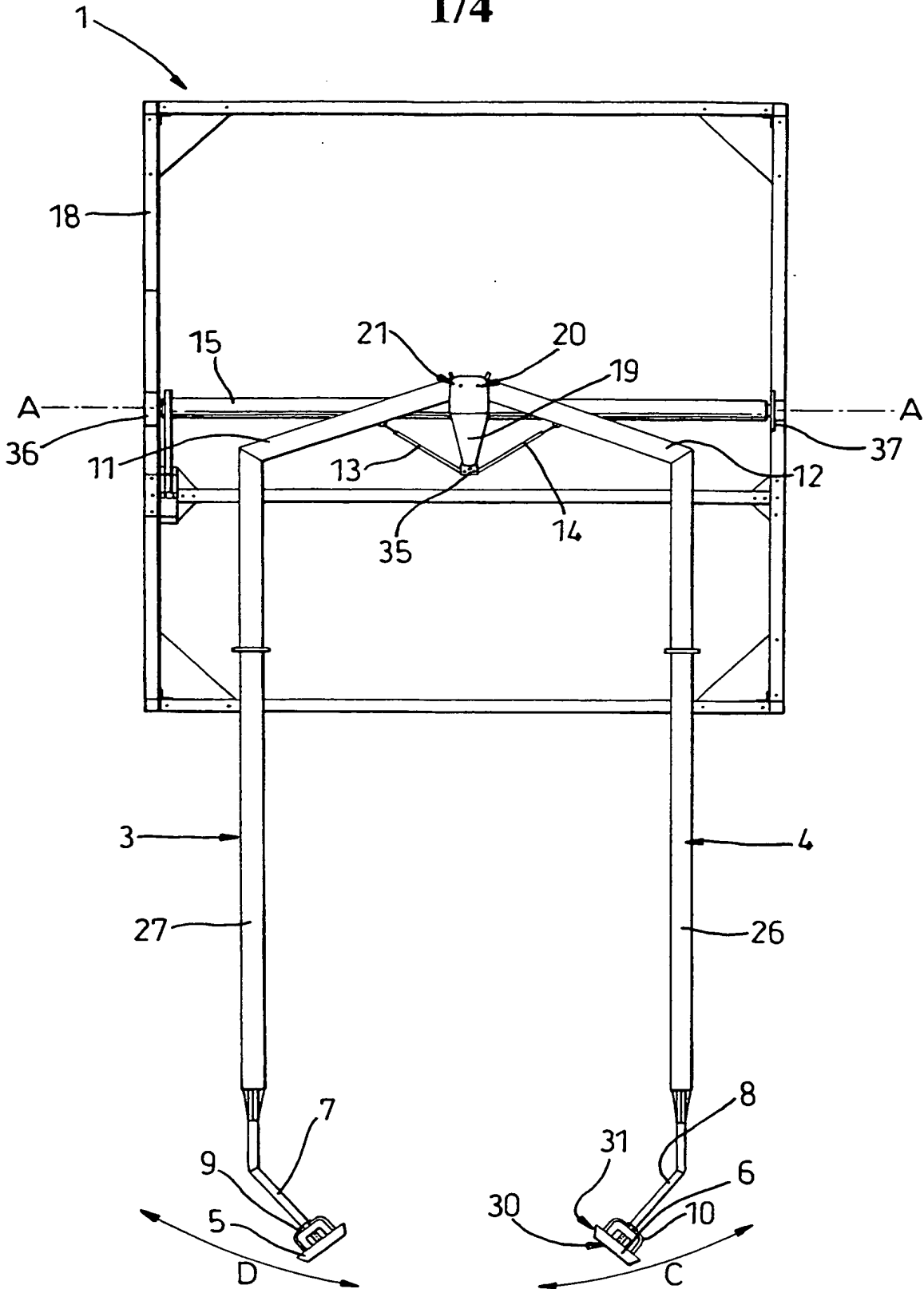
13. A method as claimed in claim 12 in which the cleaning means is pivoted generally upwardly and downwardly of the hull.

14. A method as claimed in claim 13 in which relative translational movement of the hull with respect to the pivotal axis (A-A) of the cleaning means (5, 6) is brought about.

15. A method as claimed in claim 11, claim 12, claim 13 or claim 14 in
5 which the cleaning means (5, 6) is caused to rotate.

16. A method as claimed in claim 15 in which the degree of generally upwardly and downwardly directed movement of the cleaning means (5, 6) is controlled in response to a measure of the resistance to rotation of the cleaning means.

1/4

**Fig. 1**

2/4

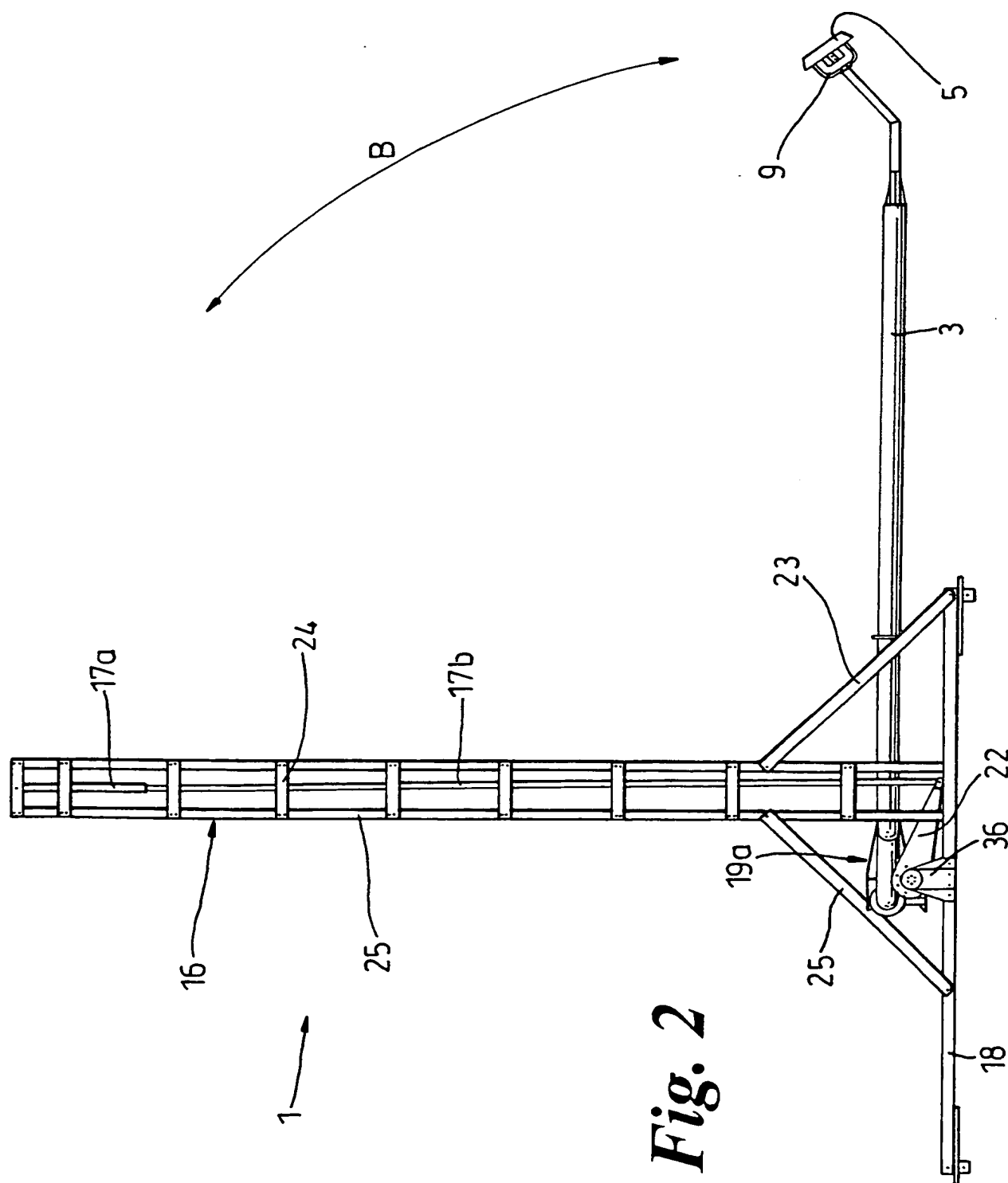
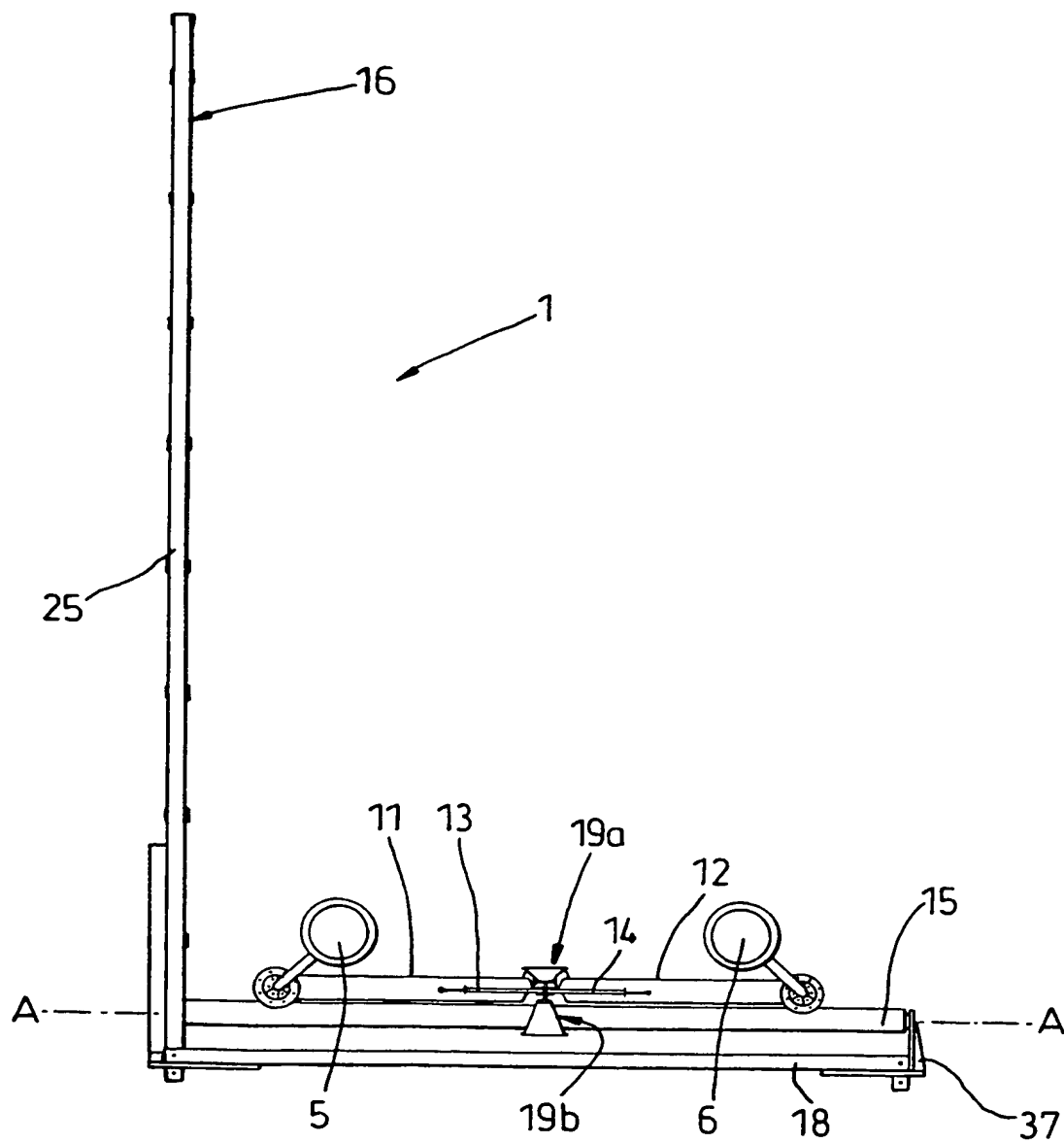
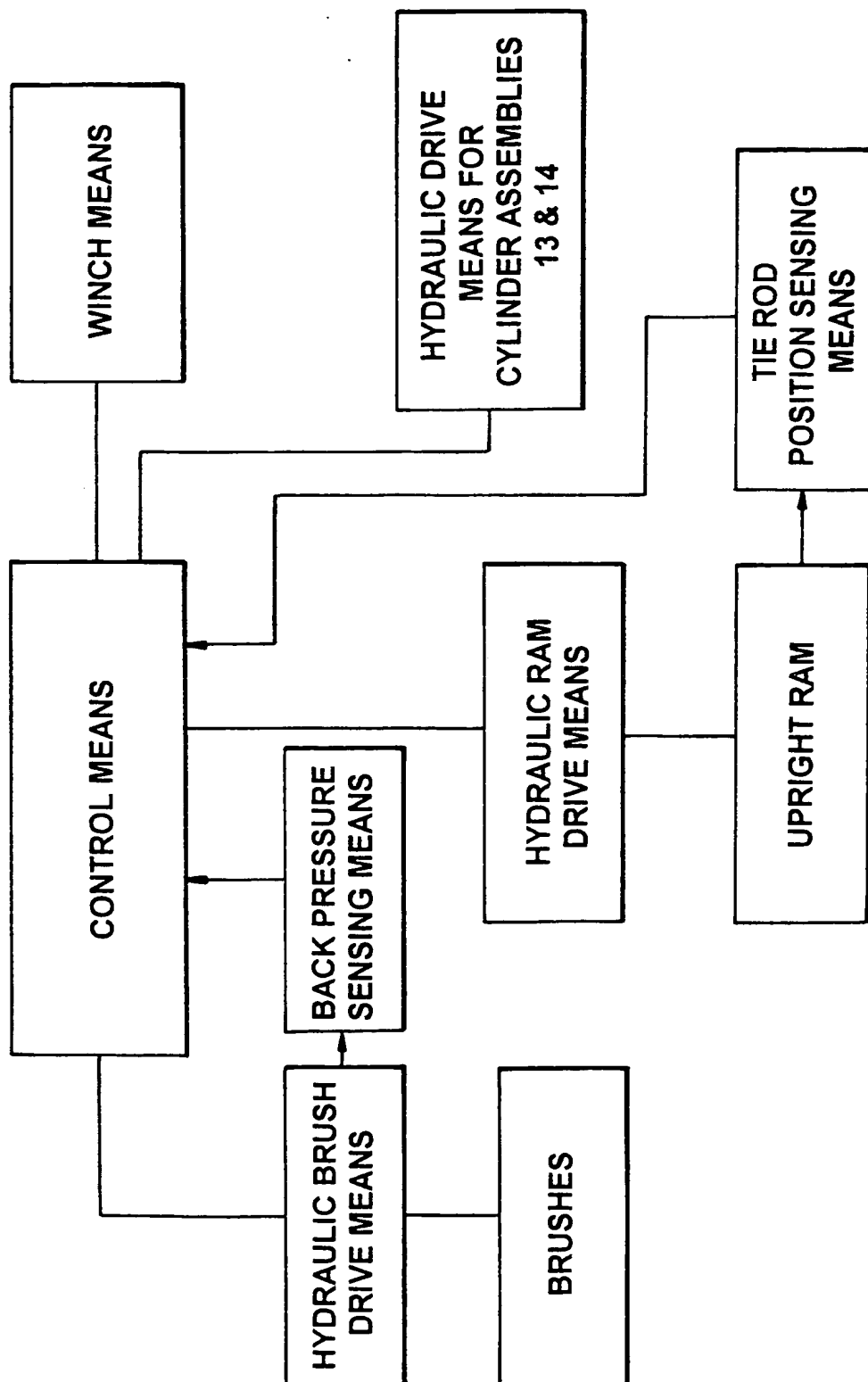


Fig. 2

3/4

*Fig. 3*

4/4

*Fig. 4*

INTERNATIONAL SEARCH REPORT

In PCT/GB 00/02505 Application No
PCT/GB 00/02505

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B63B59/08		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 B63B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 236 477 A (NORRIS ET AL) 2 December 1980 (1980-12-02)	1-4, 7, 12, 13, 15
Y	the whole document	5, 6, 8-11, 14, 16
Y	US 4 043 286 A (DOTY) 23 August 1977 (1977-08-23) column 7, line 7 - line 46; figures 1-5	5, 6, 8-11, 16
Y	FR 1 393 901 A (PHOCÉENNE SOUS-MARINE ET AL) 7 July 1965 (1965-07-07) the whole document	14
A	GB 2 022 520 A (MARINKONSULT HANS LUNDBERG A.B) 19 December 1979 (1979-12-19) page 2, line 44 - line 56; figures 1-5	1-14
-/--		
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. </div>		
* Special categories of cited documents : <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search <div style="text-align: center; font-weight: bold;">7 November 2000</div>		Date of mailing of the international search report <div style="text-align: center; font-weight: bold;">13/11/2000</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center; font-weight: bold;">DE SENA HERNAND... A</div>

INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/GB 00/02505

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 046 095 A (FIKE) 6 September 1977 (1977-09-06) the whole document -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/02505

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4236477	A	02-12-1980	NONE	
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US 4046095	A	06-09-1977	US 4007701 A	15-02-1977

PATENT COOPERATION TREATY

from the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year)

28.09.01

Applicant's or agent's file reference
GML2032

IMPORTANT NOTIFICATION

International application No.

PCT/GB 00/02505

International filing date (day/month/year)

29/06/2000

Priority date (day/month/year)

30/06/1999

Applicant

HUDD, Adrian Gerald

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



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Fax: (+49-89) 2399-4465

Authorized officer



PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference GML2032	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 00/ 02505	International filing date (day/month/year) 29/06/2000	Priority date (day/month/year) 30/06/1999
International Patent Classification (IPC) or national classification and IPC B63B59/08		
Applicant HUDD, Adrian Gerald		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 24 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consists of a total of 2 sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☒ Certain observations on the international application

Date of submission of the demand 29/01/2001	Date of completion of this report 28.09.01
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 cpmu d Fax: (+49-89) 2399-4465	Authorized officer A. Brumer 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. ...

PCT/GB00/02505

I. Basis of the report

1. This report has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*

☐ the international application as originally filed

☒ the description, pages 2-8 , as originally filed
 pages , filed with the demand
 pages 1 , filed with the letter of 06.07.01

☒ the claims, Nos. 7-16 , as originally filed
 Nos. , as amended under Article 19
 Nos. , filed with the demand
 Nos. 1-6 , filed with the letter of 06.07.01

☒ the drawings, sheets / fig. 1/4-4/4 , as originally filed
 sheets / fig. , filed with the demand
 sheets / fig. , filed with the letter of

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.
- ☐ the drawings, sheets / fig.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/GB00/02505

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims	1-16	YES
	Claims		NO
Inventive Step	Claims	1-16	YES
	Claims		NO
Industrial Applicability	Claims	1-16	YES
	Claims		NO

2. Citations and Explanations

The closest prior art is shown in D1 (US-A-4 236 477) which discloses a vessel cleaning assembly having a framework with displaceable cleaning means which follow the hull shape of a vessel moving therethrough.

The objective problem is considered to be the improvement of hull cleaning and is solved by upward and downward movement of the cleaning means on the hull, which is stationary with respect to the framework.

The invention provides for a cleaning assembly as per claims 1-11 and a cleaning method as per claims 12-16.

There is no suggestion in the available prior art as to the proposed solution.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.:

PCT/GB00/02505

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claim 1 is not phrased in a two-part form.
2. The pertinent prior art according to D1 is not mentioned and commented upon in the description.
3. Method claim 15 is appended to apparatus claim 11 which does not make sense.
4. The claims are not provided with reference signs.

10/030754

41PRTS

531 Rec'd 28 DEC 2001

REPLACED BY
ART 32 AMDT

BOAT CLEANING ASSEMBLY

The present invention relates to cleaning assemblies and in particular to marine vessel cleaning assemblies.

- 5 It is common practice for both power and sailing craft to be cleaned at least twice a year, and where performance and fuel economy are required, these can be increased significantly. However, anti-fouling paints are becoming increasingly expensive and because of world-wide anti-pollution laws the paints available to both the commercial and leisure industries are becoming less effective.
- 10 According to a first aspect of the invention there is provided a marine vessel cleaning assembly comprising cleaning means and displacement means supported on a framework adapted for location under the water, the arrangement being such that, in use, the displacement means is operative to urge the cleaning means generally upwardly and downwardly
- 15 of a hull of a floating marine vessel, and the cleaning means is arranged to contact fouling on the hull.

Preferably the displacement means comprises pivot means which is operative to pivot the cleaning means, about a substantially horizontal axis, generally upwardly and downwardly of the hull.

- 20 Preferably the cleaning means comprises rotatably mounted brush means which, in use, is caused to rotate.

The assembly desirably comprises sensing means which is operative to monitor a measure of the resistance to the rotation of the brush means.

CLAIMS

1. A marine vessel cleaning assembly (1) comprising cleaning means (5, 6) and
5 displacement means (17a, 17b) supported on a framework (18) adapted for location
under water, the arrangement being such that, in use, the displacement means is
operative to urge the cleaning means (5, 6) generally upwardly and downwardly of a
hull of a floating marine vessel, and the cleaning means is arranged to contact
fouling on the hull.
10
2. A marine vessel cleaning assembly (1) as claimed in claim 1 in which the
assembly comprises pivot means (17a, 17b, 15, 22) which is operative to pivot the
cleaning means (5, 6), about a substantially horizontal axis (A-A), generally
upwardly and downwardly of the hull.
15
3. A marine vessel cleaning assembly (1) as claimed in claim 2 in which the
pivot means (17a, 17b, 15, 22) is operative to pivot the cleaning means (5, 6) about
an axis (A-A) which is submerged.
- 20 4. A marine vessel cleaning assembly (1) as claimed in claim 1, claim 2 or
claim 3 in which the cleaning means (5, 6) comprises rotatably mounted brush
means (5, 6) which, in use, is caused to rotate.
5. A marine vessel cleaning assembly (1) as claimed in claim 4 in which the
25 assembly comprises sensing means which is operative to monitor a measure of the
resistance to the rotation of the brush means (5, 6).
6. A marine vessel cleaning assembly (1) as claimed in claim 4 in which the
assembly comprises control means which is operative to control the degree of
30 generally upwardly and downwardly directed displacement of the brush means (5,
6).